United States Patent

[11] **3,575,181**

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[22] Filed **Sept. 23, 1965**
[45] Patented **Apr. 20, 1971**

[54] **HAIR-TREATING DEVICE**
12 Claims, 23 Drawing Figs.

[52] **U.S. Cl.** **132/9**
[51] **Int. Cl.** **A45d 19/00**
[50] **Field of Search** 132/9, 7, 45; 128/52, 65, 64; 222/96, 81, 510, 541; 401/135, 139

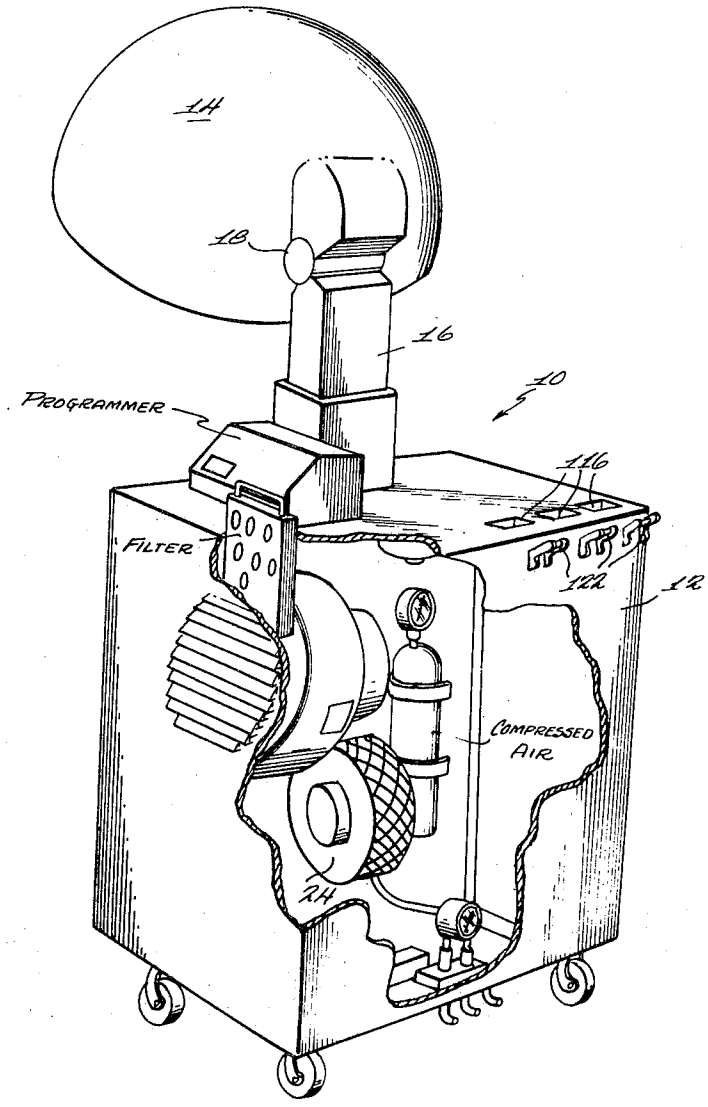
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Primary Examiner—Louis G. Mancene
Assistant Examiner—Gregory E. McNeill
Attorney—Cushman, Darby & Cushman

CLAIM: CLAIM 1. Hair-treating apparatus comprising: a headset having a crown, said headset being adapted to cover the hair and scalp area of the head of a person being treated, a plurality of brush means mounted for movement within said headset for contacting and treating hair on the head of a person, means for moving said brush means in a controlled pattern against the head of the person being treated, means for extending and retracting said brush means into and out of contact with the person's head, and dispensing means connected to the interior of said headset for selectively dispensing liquids to the hair being treated.

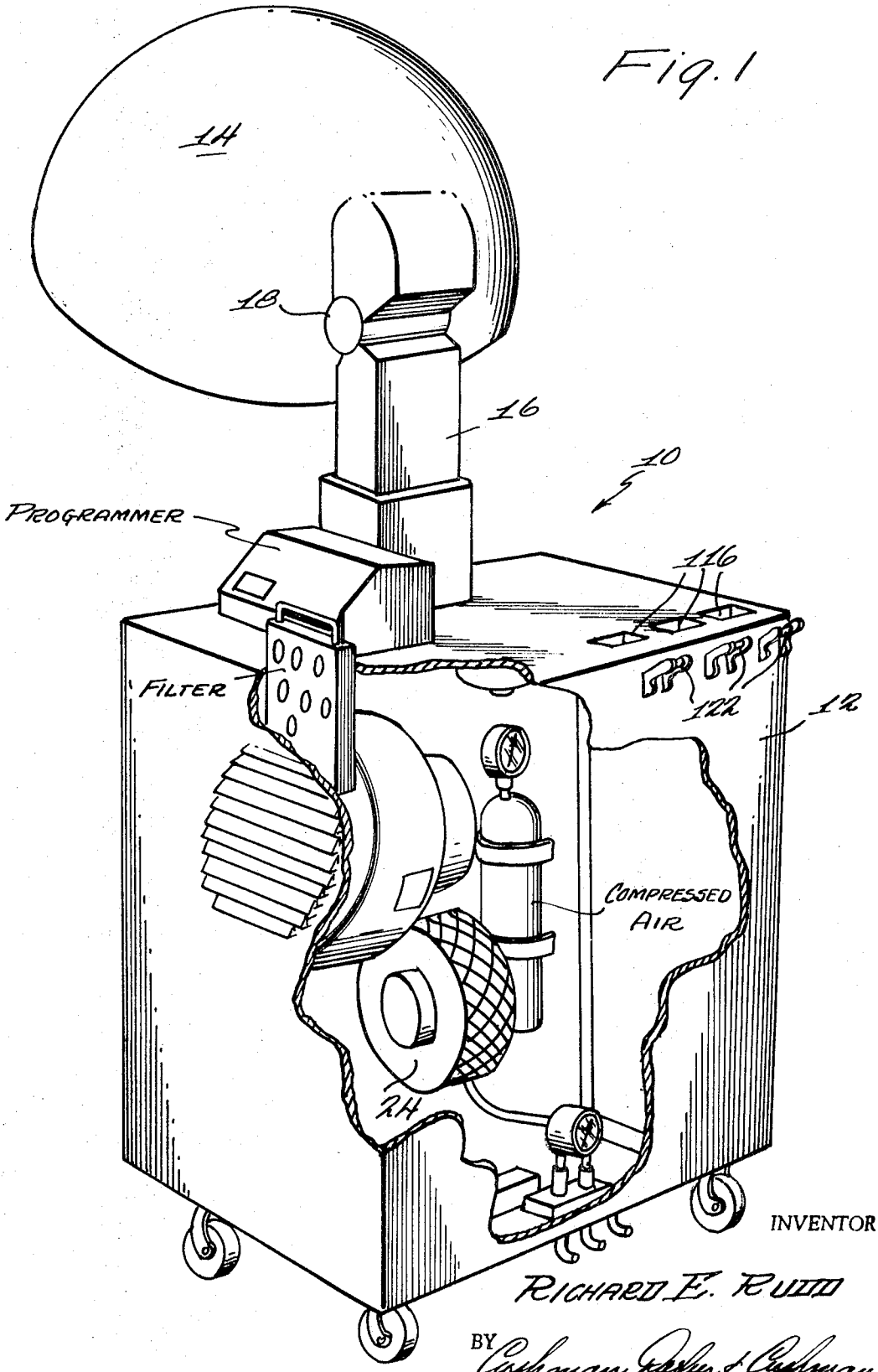


PATENTED APR 20 1971

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SHEET 1 OF 8

Fig. 1



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Fig. 2A

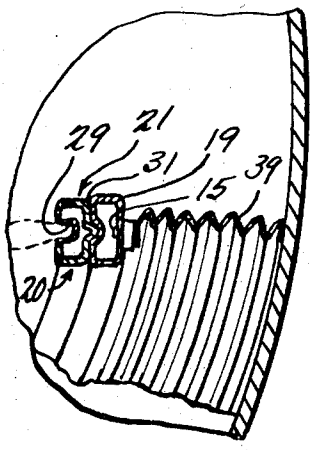
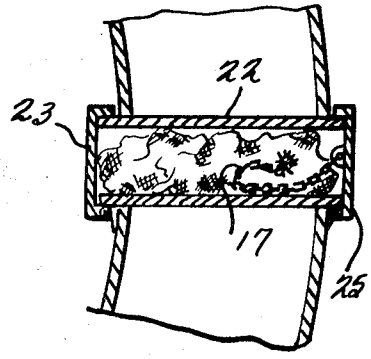


Fig. 2B



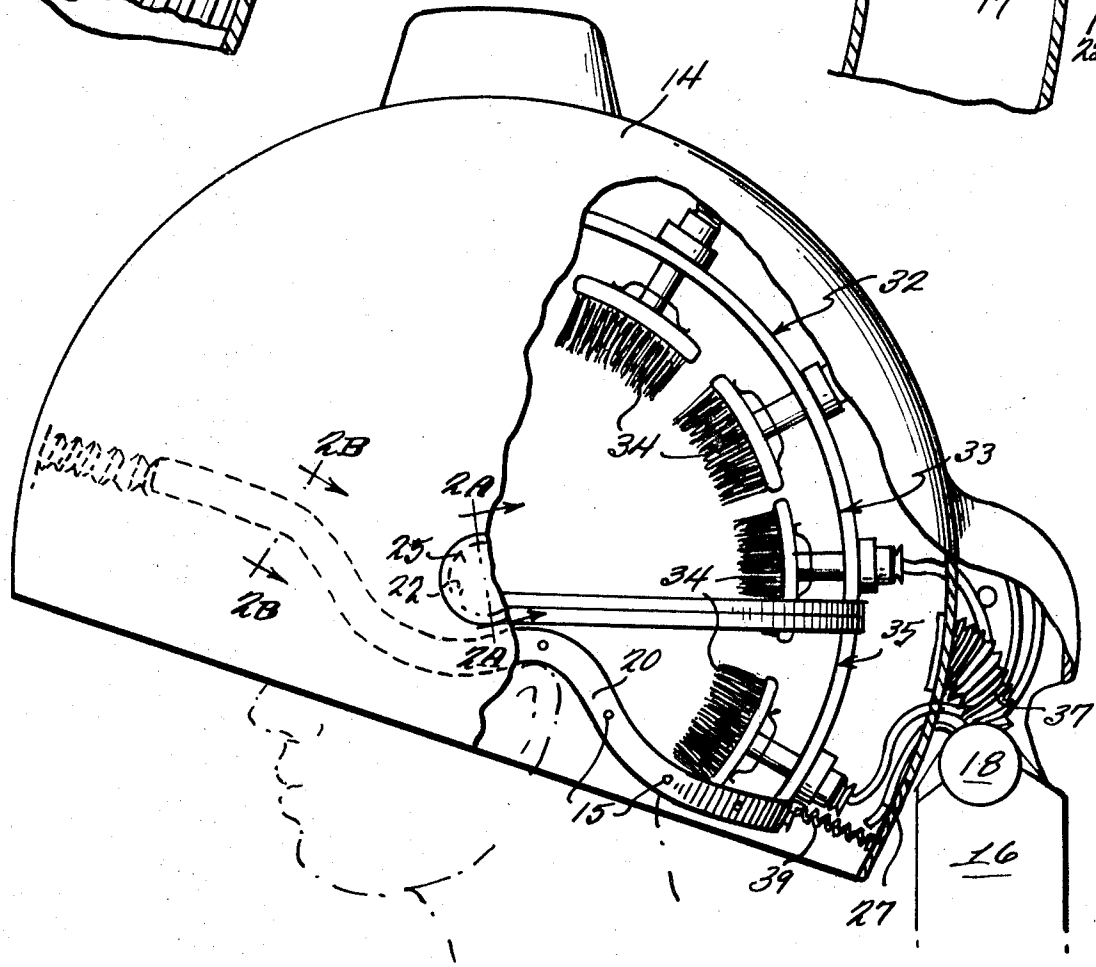


Fig. 2

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Fig. 3

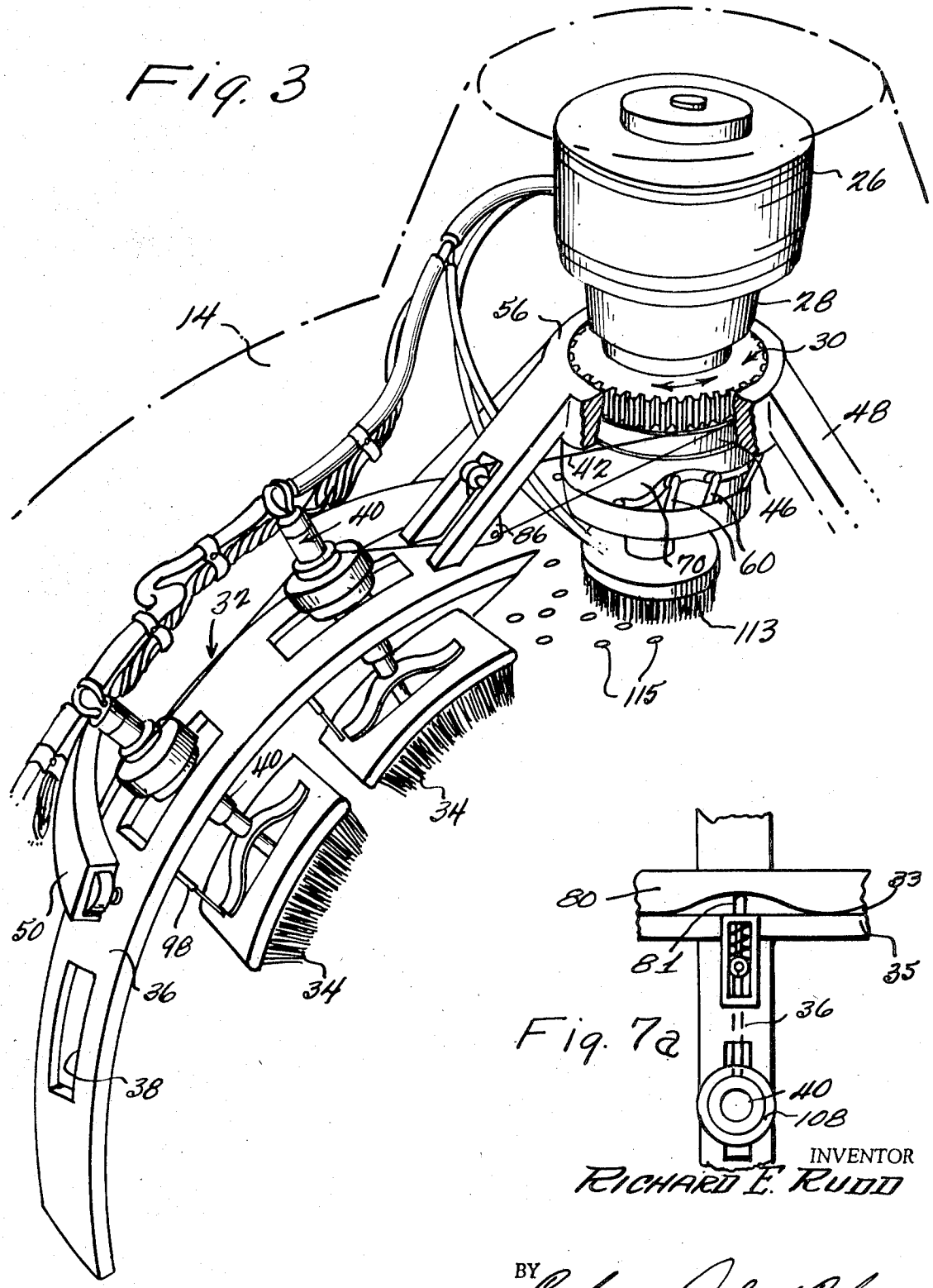


Fig. 7a

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Fig. 4

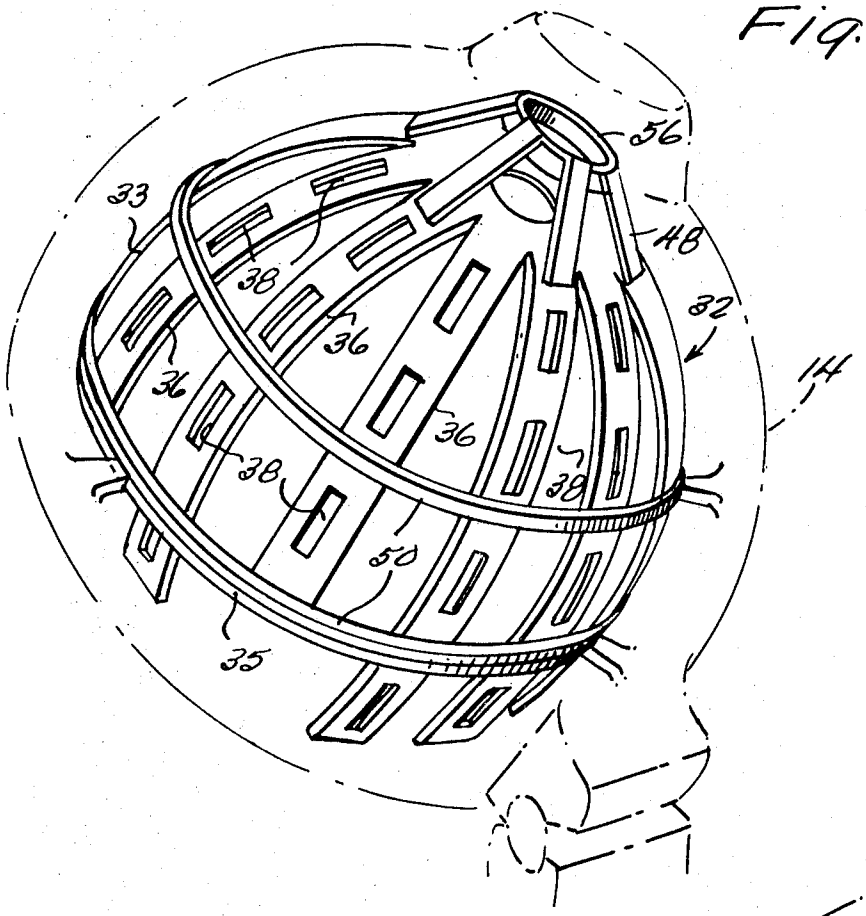
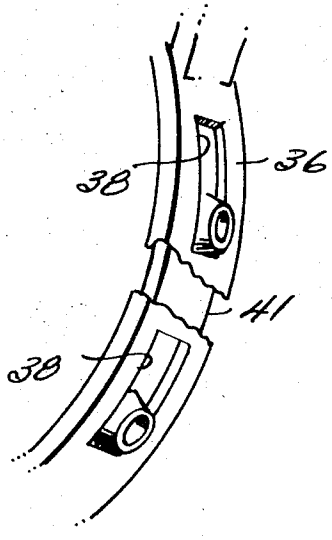


Fig. 5



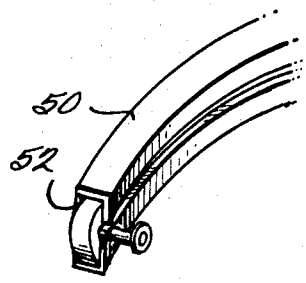


Fig. 6

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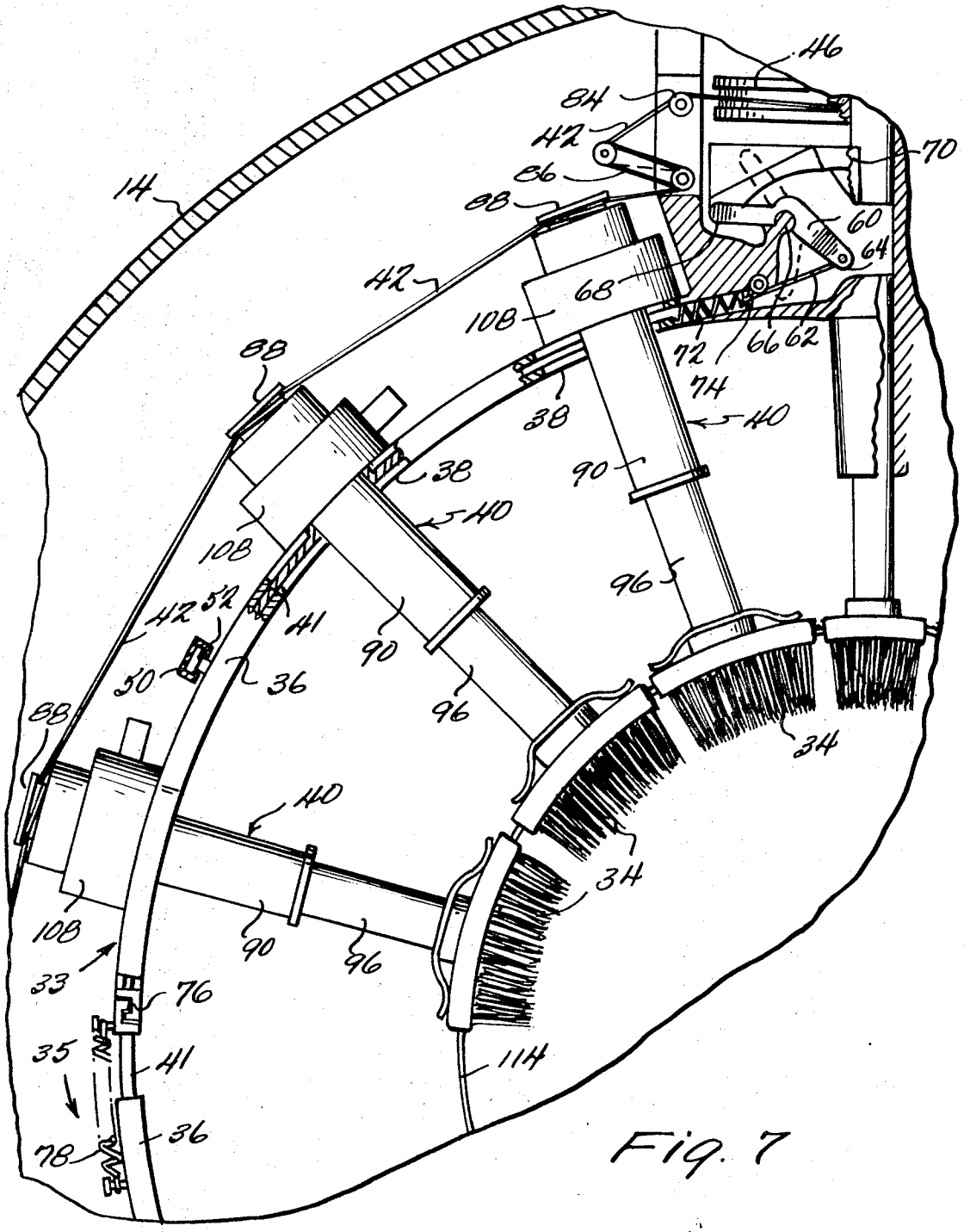


Fig. 7

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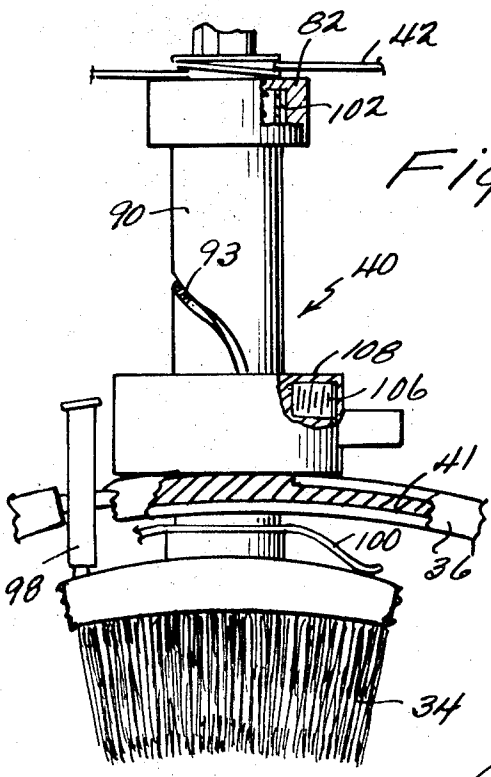


Fig. 8

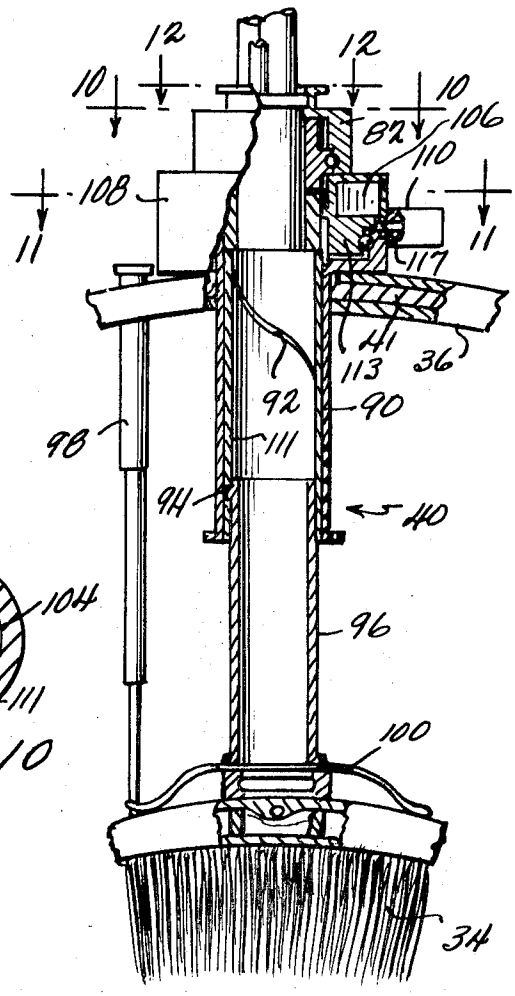


Fig. 9

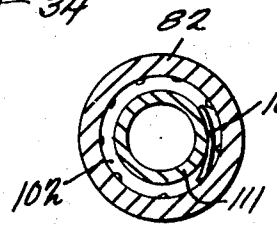


Fig. 10

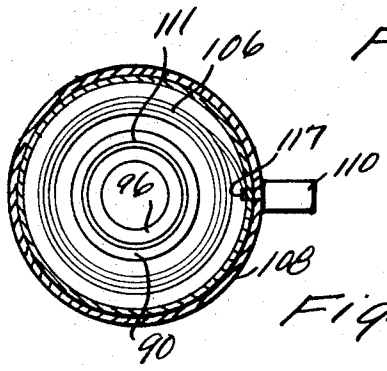


Fig. 11

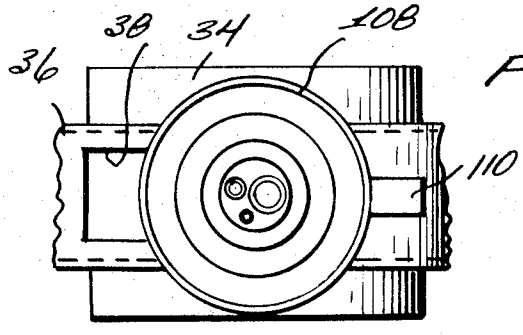


Fig. 12

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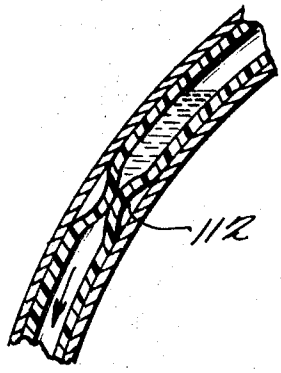


Fig. 13

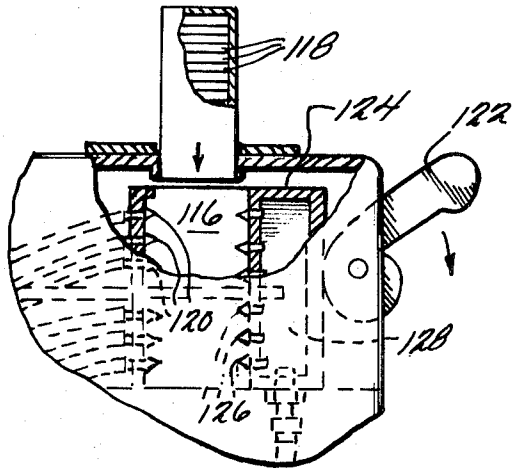


Fig. 14

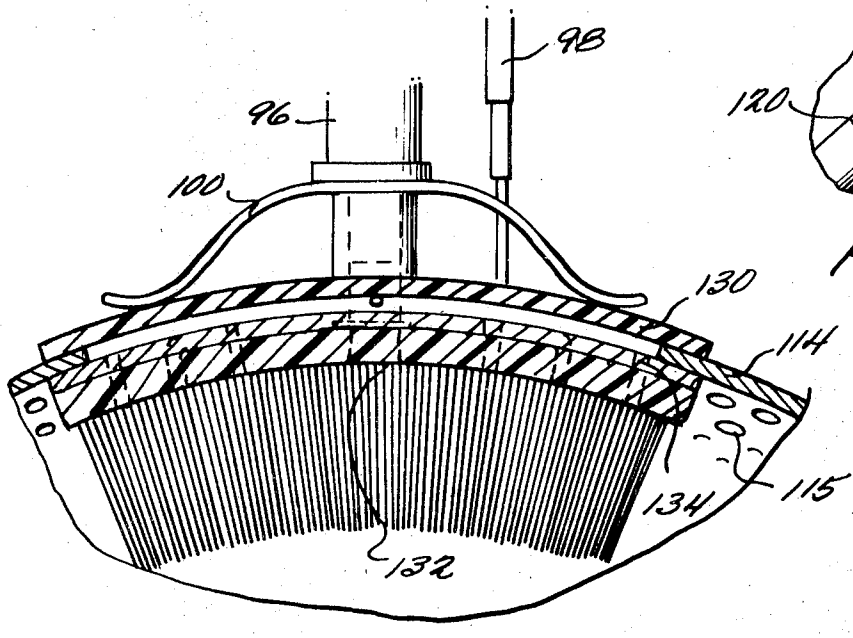


Fig. 16

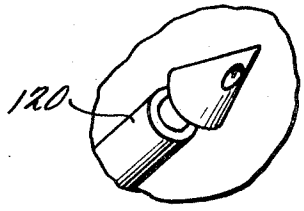
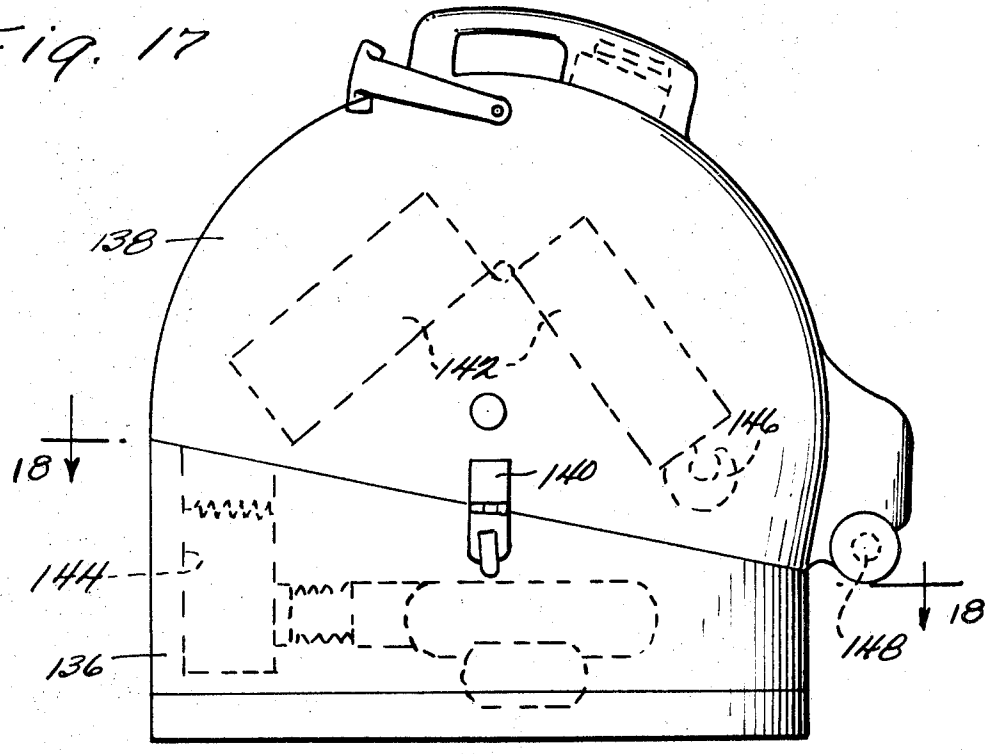


Fig. 15

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Fig. 17



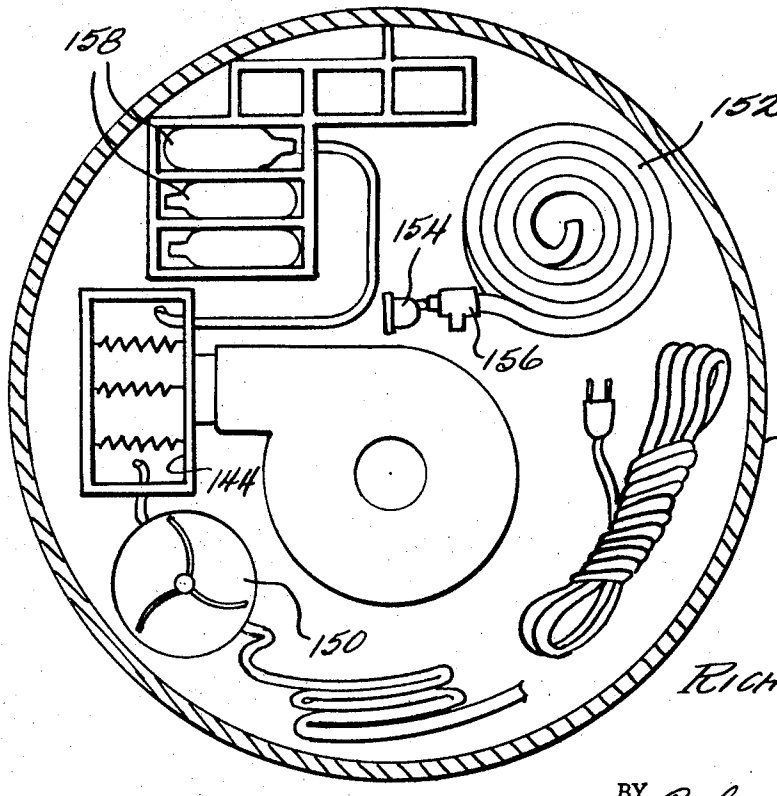


Fig. 18

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HAIR-TREATING DEVICE

This invention relates to a hair-treating device and particularly to a device which can be programmed to automatically carry out a variety of treatments on an individual's hair. The device provides for automatically and semiautomatically shampooing, rinsing, coloring and drying the hair in any sequence of steps or combination of steps as required for a particular hair-treating process. The hair-treating device of this invention is designed in a commercial form for use in beauty salons and barbershops and also in a compact model for use in the home.

Certain types of hair-treating devices are generally known in the art, and such devices have included apparatus for drying hair that has been shampooed or otherwise previously treated by manual means. Other devices have attempted to provide for the application of liquids to the head of a person but these devices have been unsatisfactory in making a thorough and complete application of liquids to all parts of the hair being treated. None of the prior-art attempts have provided for a construction which accomplishes a programmed series of treatments for the hair which is thorough and safe for use in the usual beauty salon or home situation.

In beauty salons, barbershops and homes the task of performing such functions as shampooing, coloring, rinsing and drying hair is one that is both time consuming, inconvenient, and expensive.

In commercial salons and shops, the above-described processes are ones which consume a substantial percentage of the working time of experienced and skilled operators or barbers. This in turn prevents them from applying their time more profitably to tasks where manual dexterity, skill, and creative abilities are mandatory. It also decreases the volume of customers or appointments which each operator can handle or will book in the course of a working day (from the standpoint of time available as well as physical fatigue).

In salons or shops where personnel of less skill or experience than the qualified operators, barbers or cosmetologists are employed to perform the tasks described above, the cost incurred to management in the form of salaries or other financial arrangements are an economic drain which erode the profits of the business. Also, this category of worker is often unreliable. Further, management is forced to perform the added burden of keeping records and complying with local, state and federal tax and work laws for these workers.

It is one purpose of the device of this invention to automate the type of functions described above. This in turn eliminates certain shop appliances and equipment, and it also frees the skilled operators from unnecessary harsh tasks while at the same time substantially increasing the earning power and profits in salons and shops where this device is employed; further, this machine performs similar luxury service in the home.

The functions performed by this device include but are not limited to preparation, washing, cleaning, rinsing, shampooing, coloring, massaging, drying, applying lotions or treatments including disinfectants in regulated sequences under controlled environmental conditions.

The machine permits the users or operator to adjust the headset (semiautomatically) to fit the customer's head. This action will preclude fluids or liquids (or gases if used) from escaping and seeping from the desired confined area. The adjustment device will encase or close about the head and neck area and will provide a comfortable fit, according to individual head and neck shape, size, and contour.

The temperature, flow rates, consistency, and type of solutions (liquid or gas) used in the functional processes will be controlled to the desired extent.

The machine permits the use of a wide variety of special or unique solutions as well as those products which are currently stocked and sold.

The machine is designed to permit the user to be seated in a relaxed or inclined position or in an upright or standing position while programmed functions are being performed.

The device also permits the desired functions to be selected individually or collectively as desired.

The present invention provides for a hair-treating device which is adaptable for carrying out a number of treatments on a single individual. For example, it is possible, through the use of this device, to apply shampoo and rinses and then to follow such application with a drying cycle if required. Additionally, it is possible to include cycles for coloring, massaging and treating the hair prior to the final styling of the person's hair. The hair-treating device of this invention includes a headset or hood which fits over the head of the person being treated and which contains novel actuating devices for dispensing liquids and for treating the hair and scalp of a person. The headset also includes a novel headband adapter which adjusts to individual head sizes and which serves to confine liquids or gases to desired areas within the treating zone of the apparatus. Brush units are provided for treating the hair and scalp of the person and also for uniformly dispensing separate solutions in accordance with a programmed cycle.

The hair-treating device also includes a control cabinet structure which provides for the selection of a particular program of treatment for the hair and scalp. The control cabinet structure has control mechanisms for controlling actuating devices carried in the headset unit and suitable connections are made between the control cabinet and the headset for carrying out the control functions and also for conveying liquid or other fluids to the headset. A programmer is carried by the cabinet unit and includes pushbutton actuation devices for selecting and automatically controlling a sequence of operations for the treatment of a person's hair and scalp. The programmer also provides for initial fitting of the headset to a particular head size.

The headset structure of this invention includes an inner frame unit which carries a plurality of brushes and applicators for contacting a person's hair and scalp and for applying liquid or other fluids to that area of the person's head. The frame unit has an upper movable portion and a lower stationary portion which are fitted within the hood unit so as to surround a person's head where the hair treatment is to be applied. The movable portion of the frame unit is located in the crown of the unit and above the ear line of a person's head so as to contact the major crown portion of the head and scalp. Driving means are provided for moving the upper frame portion so as to carry brushes and applicators which are mounted within the frame into overlapping patterns of movement that will assure an even and thorough treatment of hair and scalp in all areas. The lower part of the frame unit includes a stationary portion which is affixed to an inner wall of the hood. The lower portion corresponds roughly to the area of a person's head which is found around the ears and in the upper part of the neck, and it is not necessary to move the frame unit in these areas because of the limited amount of hair and scalp which is to be treated in those areas. However, means are provided in the lower frame unit for individually moving brushes carried by that portion of the frame so that an even and thorough treatment is also assured in those areas below the ear line. It is also possible to provide for a structure wherein both the upper and lower frames travel in a circular motion so that the same movements are applied above and below the ear line by an integral inner frame unit.

A plurality of brushes and applicators are mounted for individual movements within the frame unit itself. Such movements are provided by a brush track which moves along the longitudinal axes of individual brush track holder arms carried by the frame unit. The brush track holder arms are arranged so as to extend outwardly and radially from a central crown portion of the frame unit, and these arms are curved downwardly so as to follow the general contour of a person's head. Individual brushes carried by the brush tracks are constructed to be adjustable toward and away from an individual's head, and this permits an adjustable contact of all brushes carried by the hood to fit the particular shape and size of any head which is being treated. Means are also provided

for extending each brush inwardly toward the person's head until contact is made, and then movement is automatically stopped until it is desired to remove the hair-treating device from the person's head. Automatic return means are also provided for retracting all brush units simultaneously upon completion of a hair-treating operation.

The brushes of this invention provide for a combined function of applying fluids to a person's hair and also for distributing the fluids in a controlled pattern so as to thoroughly and completely treat all of the scalp and hair on the head of a person.

For this purpose, a plurality of separate conduits communicate with each of the separate brushes within the headset of this device, and the separate conduits extend to sources of supply for the various liquids which are to utilized in hair-treating processes. The sources of supply for the liquids include a novel means for expelling controlled quantities of liquid from cartridges which can be quickly and easily inserted into a liquid-discharging device carried by the cabinet.

Other advantages of this invention will become apparent in the more detailed discussion which follows and in that discussion reference will be made to the accompanying drawings in which:

FIG. 1 represents a perspective view of the hair-treating device and illustrates the relationship of a control cabinet to the headset of the device;

FIG. 2 is an elevation of the headset showing portions cut away to illustrate detail;

FIG. 2*a* represents a sectional view taken along the longitudinal axis of a hairnet storage cylinder associated with the headset illustrated in FIG. 2;

FIG. 2*b* illustrates a cross section of an adjustable headband adapter associated with the headset of FIG. 2;

FIG. 3 is a detailed view of a portion of the headset structure, showing the positions of several brushes as related to a brush track holder within the hood;

FIG. 4 is a perspective view of the frame unit contained within the headset, and illustrating an upper movable portion for said frame unit together with a lower stationary portion of the frame unit;

FIG. 5 is a detailed illustration of a single brush track holder and brush track included in the frame unit;

FIG. 6 is a detailed illustration of a roller mounting for supporting the movable portion of the frame unit in a track carried by the headset;

FIG. 7 is a cross-sectional elevation of the headset showing the construction and actuating means for the brushes carried thereby;

FIG. 7*a* illustrates in detail an actuating mechanism for moving brushes carried by a lower frame section;

FIG. 8 is an elevational view of a brush means shown in its retracted position;

FIG. 9 is an elevational view of the brush means of FIG. 8 as shown in an extended position;

FIG. 10 is a cross-sectional view taken at line 10–10 of FIG. 9 and illustrating a clutch mechanism associated with a single brush actuating means;

FIG. 11 is a cross-sectional view taken at line 11–11 of FIG. 9 and illustrating a retracting mechanism for returning the brush units to their uppermost retracted positions;

FIG. 12 is a cross-sectional view taken at line 12–12 of FIG. 9 and illustrating the means for connecting separate fluid conduits into dispensing relationship with a brush support column;

FIG. 13 illustrates in detail a pressure-controlled valve structure associated with individual liquid conduits of this invention;

FIG. 14 is an elevational cross section of a liquid discharge system for discharging liquids to individual conduits leading to separate brushes in the headset;

FIG. 15 is a detailed illustration of a single puncture means associated with the system of FIG. 14;

FIG. 16 illustrates an elevational view of a single brush element;

FIG. 17 is an elevational view of a disassembled portable hair-treating device designed for home use; and

FIG. 18 is a cross-sectional view taken at line 18–18 of FIG. 17, showing various components associated with the portable hair treating device.

Referring to FIGS. 1 and 2, the hair-treating device is indicated generally at 10, and is shown in a form that is adaptable for commercial use in beauty parlors or similar types of shops. This form of the hair-treating device includes a base cabinet 12 that carries various control devices for regulating a particular hair-treating process which is being administered by the device. A headset or hood unit 14 is supported on a column 16 above the cabinet 12. The headset includes a suitable pivotal mounting means 18 at its junction with the upper end of the column 16 so that the hood may be tilted back into an inoperative position and forwardly into an operative position. Also, the column 16 is vertically adjustable relative to the cabinet 12 so that the headset may be raised and lowered to a desired level.

The headset 14 includes applicator means and brushing means about its inner surface and in positions for contacting the head of the person receiving a hair treatment. As will be described in greater detail later, means are provided for adjusting the brushes and applicators to fit all sizes and shapes of heads, and control devices are included in the cabinet for permitting an automatic adjustment of the brushes and applicators. The headset unit 14 also includes means for admitting heated, forced air into the unit so that the treated hair may be dried after a shampooing operation or after any other treatment which is administered.

Referring to FIG. 2*a*, a hairnet storage cylinder or tube 22 is illustrated to show a hairnet in a stored position. The storage cylinder 22 is mounted between inner and outer walls of the headset 14 so that a hairnet will be easily accessible to the user or operator of the hair-treating device. The storage cylinder 22 includes an inner access cover 23 and an outer access cover 25. The inner access cover may be hinged or snap fastened to the end of the cylinder and is easily removed so that the hairnet can be withdrawn from its stored position and placed over the head of the person being treated. The hairnet is connected to one end of a cable or cord 17 which is of sufficient length to permit the net to be fully withdrawn from the cylinder 22. The cord is connected at its opposite end to the outer access cover 25, so that upon removal of the outer cover, an operator may pull the cover outwardly away from the cylinder 22 so as to pull the hairnet back into a stored position. The outer access cover 25 is snap fastened to the outer end of the cylinder 22 in a manner similar to that described for the cover 23.

An inflatable headband and adapter assembly 20 is removably mounted around the entire lower perimeter of the hood unit 14 and is placeable around the hairline of the person's head so as to prevent the movement of shampoo or hair-treating liquids downwardly past the headband and adapter assembly. As shown in FIG. 2*b*, the headband and adapter assembly includes a relatively rigid headband 19 which is preformed to substantially follow the contour of a person's hairline. An adapter 21 is constructed to be snap fitted and retained within the confines of the headband 19, and the adapter 21 includes an inflatable inner wall 29 which can be expanded by air pressure to conform to the particular head size which is being treated. The outer wall 31 of the adapter 21 is made of a rigid material having a projecting rib which can be mated with a groove formed in an adjoining surface of the headband 19. Thus, the adapter ring can be snap fitted into or easily removed from its assembled position with the headband 19. The headband 19 includes fastening devices 15 about its outer surface so that it can be clipped into its usual position, as illustrated in FIG. 2. The fastening devices 15 are designed to permit an easy fastening and removal of the headband and may be in the form shown or of any other design. The headband is designed to follow the contour of a person's hairline, but is made from a sufficiently flexible material so that it can be formed into various contours

and shapes. By utilizing the headband and adapter assembly 20, a larger head-receiving opening may be included in the headset, than has been possible with prior devices, while at the same time there is provided a good sealing means between the inner lining of the headset and the head of a person being treated. If it is desired to use unusually large hair rollers (for example, rollers having a 2-inch diameter) on the person's head, the headband and adapter unit 20 is unsnapped from its mounted position until the head has been properly placed within the headset. Once the person's head is in place, the unit can be snapped back in place, and then the wall 29 is inflated to form a seal between the adapter and the person's head. As illustrated in FIGS. 2 and 2*b*, the headband is mounted against a membrane or wall member 39 which completes the sealing of the hair and scalp within the treating zone of the headset. The membrane 39 may be convoluted, as illustrated, and it surrounds the entire perimeter of the headset opening. The headband and adapter of this invention provides for an accurate placement of an inflatable tube to follow a desired hairline contour, as determined by the shape of a relatively inflexible headband. The means for inflating the adapter is not illustrated but includes a hand-operated pumping device which can be actuated by the person who is being treated. For this purpose the control means for the pump is located in a position where a seated customer can easily reach the control for adjusting the inflation of the headband.

The headset 14 also includes a pump line 27 for removing liquids and solutions which accumulate in the lower part of the unit during a hair-treating operation. The pump line 27 is connected to a conventional suction device within the cabinet 12 and provision is made for discharging fluids from the headset and into a suitable drainage connection associated with the cabinet 12.

The cabinet 12 includes a blower 24 for forcing heated air through a hose 37 and into the hood unit, and suitable controls are provided for regulating the temperature and draft of the blower means. Additionally, the cabinet 12 includes a programming device for establishing a sequence of treatments to be administered by the hair-treating device, and such treatments may include washing, rinsing, drying and coloring functions in various orders and for various durations. The cabinet also includes a novel liquid-discharging means for receiving cartridges of liquids, for example, liquid shampoo or liquid hair color. The discharging means provides for breaking the cartridges and expelling liquid from them so that the liquids can be conveyed to the various administering brushes carried within the headset 14. For this purpose, a number of conduits are provided between the cabinet and the hood unit, and suitable water lines are also provided for carrying hot and cold water and mixtures of the same into the cabinet and ultimately to the treating zone within the headset or hood unit.

Referring to FIG. 3, the hood unit 14 has been cut away to show the various components included within the unit for carrying out the treating functions of the hair-treating device. A motor unit 26 is mounted in an upper central position within the hood unit and provides a source of power for moving all adjustable and movable parts within the hood 14. The motor is of a conventional construction and is preferably an electrical motor which is controlled by the programmer and by built-in control devices.

The motor 26 drives the movable parts within the headset unit through a gearbox 28 which is connected to three concentric drive shafts leading from the motor. The gearbox 28 includes gearings for providing: (1) a reciprocating circular motion to a main drive unit 30; (2) a brush-adjusting motion; and (3) a reciprocating motion for moving all brushes by means of a brush track. The main drive unit is interconnected to an inner frame unit 32 which is mounted within the hood and which includes a movable upper portion 33 and a fixed lower portion 35. The frame unit 32 carries brush devices 34 in a plurality of brush track holders 36 which extend radially and downwardly about the inner circumference of the hood. The brush track holders 36 are in the form of hollow arms which are affixed to a crown portion of the frame unit 32, and thus all circular reciprocating movements of the upper frame portion 33 about the vertical axis of the motor 26 are relayed to the brush track holders and to the brushes carried therein. It will be appreciated that the reciprocating rotative movements of the upper frame unit 33 are about an axis which is generally a vertical axis passing through the crown of the hood. The brush track holders 36 are provided with elongated slots 38 which receive adjustable support cylinders 40 for supporting the brushes 34. The support cylinders 40 and the brushes which are carried on their innermost ends are carried on brush tracks 41 which are mounted for reciprocation up and down along the individual longitudinal axes of the track holders 36, and in this manner the brushes can be moved up and down in their contact with the hair which is being treated.

In addition to the motions just described, the brushes 34 are also mounted for movement toward and away from the head of a person being treated by the device. Such movement is necessary to accommodate the plurality of all brushes to all shapes and sizes of heads which are being treated. As shown in FIG. 3, the individual brushes 34 are mounted on support cylinders 40 which are placed in spaced positions along the brush track holder arms 36. The support cylinders 40 are shown as being made up of at least two telescoping sections which can move toward and away from each other along the central longitudinal axis of each support cylinder. Such movement results in a movement of the various brushes toward and away from the contoured head of a person. Movement of the brushes inwardly toward the center part of the hood 14 is accomplished by a driving unit 46 which can be selectively driven from an output shaft of the gearbox 28. The driving unit 46 is in the form of a pulley which winds up or releases a cable 42. When it is desired to extend the brushes downwardly to the center of the treating zone within the hood, the driving unit 46 is actuated so as to wind the cable 42 in a direction which will cause the telescoping sections of columns 40 to extend away from each other. The telescoping movement of the sections which make up the columns 40 is accomplished by a spiral groove mechanism which will be described in greater detail below. Basically, this movement causes a spiraling of one section relative to the other so that an extension or retraction of an inner section relative to an outer section may be determined by the direction of rotation between the two sections. Additionally, a spring windup is incorporated in the brush adjustment structure so that when the brushes are extended they are acting against the tension of a windup spring which provides for a retraction of all extended brushes when they are released from their extended positions.

Looking now to the construction of the inner frame unit 32 in greater detail, as shown in FIG. 4, 5, and 6, it can be seen that the inner frame is constructed to generally follow the contour of the interior of the headset 14. The inner frame includes a crown portion and separate framing structures 48 are carried at the crown portion of the unit for supporting the motor housing and the gearbox housing associated with the driving means for the device. The inner frame unit is divided into an upper frame portion 33 which is movable for reciprocation about a generally vertical axis taken down through the crown portion of the unit. A lower frame portion 35 is rigidly affixed to a lower part of the headset, and no rotative movements are applied to the lower frame portion. The separate frame portions are mounted to the interior of the hood by support bands 50 which are secured to an inner face or to mounting posts within the shell of the headset 14. The support bands 50 are in the form of guide rails having guiding slots 52 for receiving rollers or other bearing devices carried by the brush track holders 36. The rollers may be attached on the outside surface of the separate brush track holders so as to ride in the guiding slots of the support bands 50. In this manner, rotative forces can be applied to the inner frame unit and the upper frame portion can be rotated within the guiding and supporting structure provided by the support bands 50. The means for rotating the inner frame unit includes the

driving means 30 which is connected to the gearbox 28. The driving means may include gear teeth about its periphery and these gear teeth engage with matching teeth formed about the inner surface of a support ring 56 which is rigidly carried at the crown portion of the inner frame unit. Alternatively, the driving means may be welded directly to the support ring 56 so as to form an integral driving structure. In the preferred embodiment of this invention, the rotative movements which are applied to the upper frame unit are limited to reciprocation back and forth about the vertical axis which corresponds to the drive shaft axis of the motor. Suitable gearings and control devices are provided for selectively engaging or disengaging the driving means so as to reciprocate the entire upper frame unit in accordance with a controlled program.

As shown in FIG. 7, the brush track holder arms extend radially downwardly from the crown portion of the inner frame unit and include individual brush tracks 41 which are carried for reciprocating movement within the separate brush track holder arms 36. The brush tracks function to carry the individual brush means 34 in spaced positions along the lengths of each of the brush holder arms, and further, the brush tracks function to apply reciprocating movements to the brushes along the longitudinal axes of the brush holder arms. In this manner, all of the brush means carried within the hair-treating device can be moved back and forth within limited reciprocations, and this movement coupled with the circular movement which can be applied to the inner frame unit results in a thorough and even application of fluids to the hair being treated. The separate brush tracks 41, which carry and move all of the brush means contained within the device, are moved by a cam and by a plurality of rocker arm means which are positioned to be actuated by the cam surface. The actuation means of the brush tracks is shown in FIG. 7, and it can be seen that each of the brush tracks is linked to its own rocker arm 60 at an upper end of the brush track. The linkage may be of any conventional type, but a preferred linkage is shown in the form of a short cable 62 which connects a lower end 64 of each rocker arm with the upper end of its brush track. The rocker arm 60 is mounted for rocking movement about a pivotal axis determined by a support 66, and the support is in the form of a ring which may be molded or otherwise formed integrally with parts of the crown portion of the inner frame unit. Upper ends 68 of the rocker arms are engaged by a rotating cam 70 which has a cam surface for applying rocking movements to the individual rocker arms. By selecting a particular contour for the cam surface, the plurality of rocker arms can be actuated to move the brush tracks up and down to the desired amount and at the desired frequency. A spring means 72 is inserted between the upper end of each brush track and a supporting structure 74 carried by the crown portion of the inner frame unit. The spring means is tensioned to normally return each brush track 41 to its lowermost position within its brush track holder 36, and upon the application of rocking movements to the separate rocker arms 60 the brush track can be moved upwardly to the desired extent. Of course, the range or movement of the brush tracks within the brush track holders is calculated to correspond to the extent of movement which is possible for each of the brush columns 40 to make in the individual slots 38 which are formed in the brush track holders. Also, the range of movement of the brush tracks is varied in accordance with the head size which is being treated. As the individual brushes are extended further toward the center of the headset to accommodate smaller head sizes, the brush tracks are reciprocated for shorter distances than when the brushes are in upper positions for larger head sizes. This adjustment in the range of movement is accomplished by the programmer, which selects the portion of the cam 70 which will actuate the various rocker arms 60.

The up and down movement of all brushes within an individual brush track holder, as just described, also applies to those brushes carried in the lower frame portion 35. Although the lower frame portion 35 can be but is not normally rotated, as is the upper frame portion 33, it is a feature of this invention that the brushes carried by the lower frame portion are moved up and down by the same mechanism which actuates brushes carried by the upper frame portion. FIG. 7 illustrates a connecting link 76 between the brush track holders of a single brush holder arm where the holder arm is divided for the necessary plane of rotation between the upper and lower frame portions. The connecting link 76 permits relative rotational movements between the upper and lower frames, and also permits the brush tracks associated with the upper brush track holder arms 36 to actuate brush tracks associated with the corresponding lower brush track holders. Thus, upward movements of a brush track, as dictated by the cam and rocker arm means, results in upward movements of all brushes carried by both track sections associated with the upper and lower frame portions. A spring means 78 is interconnected between the brush track holder of the lower frame portion 35 and its respective brush track so that the brush track will normally be returned to its lowermost position when it is not being moved by a pulling movement of a rocker arm 60. FIG. 7*a* illustrates an alternative construction for actuating the brushes of the lower frame portion 35 which includes means for reciprocating the brush tracks in response to circular movements of the upper frame unit 33. The upper frame portion 33 carries a ring 80 having a cam surface. As the upper frame portion rotates about its vertical axis the cam surface of the ring 80 contacts and actuates follower members 81 affixed to each of the brush track holders of the lower frame portion 35. The follower members 81 are linked to brush tracks within the brush track holders, and when the followers are moved up and down by their contact with the ring 80, the brush tracks and the brushes carried thereby are likewise moved up and down.

Although the movements of the brush tracks have been described with reference to a cam and rocker arm construction, it is contemplated that a rotating central cam may be directly connected to a suitable follower and linkage means which is rigidly connected to the brush tracks so as to directly drive each of the tracks up and down within their respective holder arms.

FIG. 7 also illustrates the actuating means for controlling the extension and retraction of the individual brushes 34 which are supported at the ends of the individual support columns 40. The actuating mechanism for extending and retracting each of the brushes includes a cable means 42 extending from a central actuating pulley 46 and then downwardly into driving contact with all of the brushes carried by a single brush track holder 36. Separate cables extend from the central pulley 46 across each of the separate brush holder arms, and all of the cables are actuated simultaneously by the central pulley so as to apply an extending or retracting movement to all brush means at the same time. As illustrated in FIG. 7, a typical cable for one of the brush holder arms is shown as extending over rollers 84 which are carried by a tension device 86, and then the cable is wound around and between pulley means 88 carried by each of the brush support cylinders 40.

With reference to FIGS. 8 and 9, the support columns 40 and brush means carried thereby are shown in completely retracted and completely extended positions, respectively. It can be seen that when the brush unit is in its retracted position of FIG. 8 the column 40 extends well above the brush track holder arm 36, as opposed to its position of being substantially below the brush track holder when in its extended position of FIG. 8. Because of the relative changes in position of the pulley means 88 which are carried at the upper ends of the columns 40 and because of the reciprocating motion of the brush track, a tensioning device 86 is included to accommodate the change in lengths of the cables 42, as required to compensate for variations caused by the above motions. The pulley means 88 carried by each brush support column is rigidly secured to an upper portion of the column so

that when turning movements are applied to the pulley by a winding and unwinding of the cable 42 from its central actuating pulley 46, a rotation is applied to one of the cylinder members which make up the telescoping support columns 40. For example, the support column pulley 88 in FIG. 9 is shown as being drivingly connected to the outer and inner telescoping tube members 90 and 96 so that rotational movements applied to the pulley 88 will cause the tube members to likewise rotate. The outer tube 90 is provided with a helical groove 93 about its outer surface, and this groove 93 receives a projecting follower member which is carried in the brush track. As the pulley 88 is rotated, the outer tube is rotated and guided by the groove 93, and the outer tube only is extended by the initial rotation of the pulley 88. When the outer tube 90 reaches its lowermost extended position relative to the brush track, it is stopped and a continued rotation of the pulley 88 causes the inner tube to be extended by the rotation of a driving cam 111. An inner helical groove 92 on the driving cam 111 engages a follower member 94 carried by the inner tube and causes the inner tube to be extended. Brushes 34 are positioned at the ends of the inner tubes 96 and are mounted to permit the tube to rotate relative to the brush unit. The brushes are prevented from rotating by a telescoping pin means 98 which extends from adjoining parts of the brush holder arms for each brush unit. Also, a spring means 100 is included in the mounting means for each brush 34 so as to permit a certain amount of limited resilience against any surface that it may contact.

Each adjustable support column 40 includes a clutching mechanism for automatically stopping an extension movement of any individual column upon contact of the brush means carried by the column with the head of a person being treated. This feature is important because it permits all brushes to be simultaneously extended by the cable mechanism, just described, from a central pulley means which is actuated to wind and unwind all cables on demand. Normally, all brushes would extend at the same rate and for the same distance, but the clutching mechanism of this invention provides for an automatic stopping of individual brushes upon contacting a surface. In this manner, all brushes can be extended to fit the contour of any shape or size of head which is being treated by the device. The clutching mechanism 102 is illustrated in FIG. 10 in the form of a leaf spring 104 which is interposed between a turning part 82 carried by the winding pulley 88 and a turning part connected to the inner tube member 96. The spring member may be in the form of a leaf spring having sufficient surface area to contact and drive the upper end of the driving cam member 111. The upper end of the driving connection is provided with a series of dimples or projections about its inner surface where the leaf spring contacts that surface for driving the same. Where there is no resistance against the extension of the brush member, the leaf spring makes a driving contact with the dimpled surface of the inner tube member, and the outer tube continues to drive in an extending direction. However, when the brush 34 contacts the head of a person, there is a resistance to continued extending movements of the inner tube member, and the tension of the leaf spring is selected to permit a slipping of the spring over the dimpled surface so as to interrupt the normal driving connection at that point. Thus, the driving cable 42 continues to rotate all pulleys connected to the cable, but some of the pulleys may be interrupted in their driving relationship to their support columns 40 when the brushes carried by the columns meet a given resistance.

FIG. 11 illustrates a windup spring mechanism associated with each support column 40 for assisting in a return of the individual brush units to their completely retracted positions when the direction of movement of the cable means 82 is reversed. The windup mechanism may be in the form of a helical spring 106 which has a normally wound configuration when the brush unit is in its FIG. 8 position of complete retraction. The spring 106 is connected at its inner end to the outer tube member 90 which is connected to the pulley 88 so that upon extension of the support column by a rotation of the tube members, the spring is unwound. The outer end of the spiral spring 106 is rigidly affixed to a stationary cylindrical housing 108 which does not rotate, and when the brush unit and column are fully extended, the spring means 106 is under a tension which would normally cause the spring to resume its position shown in FIG. 8. However, brush units are held in their respective extended positions by stopping all movements of the cable means 42 during any particular hair-treating operation, and a solenoid-operated lock 110 prevents the spring 106 from retracting until the lock is released. As illustrated in FIG. 9, the lock 110 includes a pin 117 which can be extended and retracted into locking engagement with an inner rotating member 113 connected to the inner tube member. Upon completion of the hair treatment, the locks 110 for all of the brush units are automatically retracted so as to permit a retraction of all brushes by the action of the springs 106. If some of the brush units reach their uppermost retracted positions prior to the complete retraction of other units, the clutching mechanism described for FIG. 10 permits a continued rotation of all pulley units by the cable 42 for all brush columns until the brushes have all reached their uppermost positions. As an alternative to the spring retraction mechanism just described, the brushes can also be adjusted by suitable gearings and solenoid-operated switches so as to be extended and retracted, as desired.

FIG. 12 illustrates a top plan view of a single brush unit, and connections are shown into an upper central part of the support column 40 for receiving various conduits which are connected to sources of liquid used in the hair-treating operations. For example, one of the conduits may be a waterline for dispensing clear water at preselected temperatures to the hair and scalp of a person being treated, and the remaining conduits may convey hair dye or color and shampoo or rinsing solutions. The conduits are connected to main lines in a central part of the hood device and lead into the cabinet 12 where they are connected to a liquid supply. Suitable valving devices are included in the cabinet structure for controlling the flow of liquids through the different conduits and ultimately into the brush means 34 where the liquids are applied to and spread over the hair of a person being treated.

In a preferred form of the present invention, liquid dyes, rinses or shampoos are conveyed to the various brush columns through conduits having pressure-regulated valve means within the conduits and in the proximity of the dispensing points for liquids. These liquids are conveyed through the conduits under a low pressure up to the points of the pressure valve means, and the valves are constructed to prevent the dispensing of any liquid until the line pressure of the conduits is raised beyond a certain level. The advantage in this system resides in the ability to convey a color or other liquid right up to the point to where it is dispensing into an individual brush unit and onto the hair which is being treated. Alternatively, the valves can act to merely delay the passage of fluid for a short time until all conduits are filled. Because of the varying lengths of conduits between the source of supply and the separate brushes carried in different locations within the headset unit, it is important to control the release of a solution so that the hair is being treated at the same time and to the same degree in all places. This invention provides for a restricted portion 112 in each of the conduits, as illustrated in FIG. 13. The restriction of the conduits serves as a pressure-responsive valve, and the restriction is sufficient to prevent the passage of liquids when the conduits are under a very low line pressure. Because of this characteristic, a liquid, such as a hair color, can be conveyed under a low pressure to the valve which is associated with each brush member, and the liquids can then be released simultaneously for all brushes by simply raising the line pressures by an amount which will overcome the valve restriction. Preferably, the separate valves are located in a close proximity to the points of dispensing the liquid, and a suitable location is near the support columns 40

where the conduits enter the individual columns for dispensing liquids to the same. The interior surfaces of the columns are preferably coated with a liquid-repelling coating material such as Teflon or a silicone so that liquid residue will not accumulate in the columns.

A separate brush unit **113** is located at the crown of the headset, and this unit is connected to a drive shaft means from the motor **26** so as to be reciprocated in circular motions.

All of the brushes of the headset are attached to an inner liner **114** which defines an inner surface for the headset. The liner **114** includes perforations **115**, so that heated air can circulate through the headset when the blower in the cabinet is actuated for a drying operation. The liner **114** may be made from a plastic material but should be sufficiently resilient to accommodate movements of the brushing devices which are attached to the liner about their outer edges.

A novel means for conveying liquids to all of the brushes and for releasing them at a desired time is shown in FIG. **14**. This liquid-discharging structure is preferably carried within the cabinet housing **12**, and includes a chamber **116** for receiving a package of liquid cartridges **118** which can be individually punctured so as to release liquids into conduits leading to all of the separate brushes. For this purpose, the conduits are shown as terminating in receiving nozzles **120** located along one wall of the loading chamber. The receiving nozzles **120** include puncturing means such as shown in FIG. **14** and each nozzle can be placed into and through the wall of a cartridge so that liquid will be released into the receiving nozzle. Cartridges can be made up to correspond to the positions of the receiving nozzles within the loading chamber **116** and a stack of such cartridges for any particular liquid can be placed in a rack and lowered into the chamber in a position for puncturing. A loading handle **122** is mounted so as to move an opposite wall **124** of the loading chamber toward the wall carrying the receiving nozzles. The opposite wall includes separate puncturing nozzles **126** corresponding to each of the nozzles carried in the receiving wall. Upon movement of the opposite wall inwardly toward the stack of cartridges, all puncturing nozzles on both walls enter separate cartridges, and the liquid within the cartridge is ready to be conveyed into the receiving conduits leading to the brushes. Liquid is expelled from the cartridges by means of air pressure which can be admitted through the hollow puncturing nozzles carried by the opposite wall **124**, and the entry of air pressure through those nozzles serves to expel the liquid from each adjoining cartridge into its respective receiving nozzle. The air pressure can be regulated from a suitable supply, such as a compressor and storage tank, and a low pressure can be applied for the purpose of carrying a liquid up to the pressure-responsive valves **112** described above. Then when it is desired to release the liquid onto hair which is being treated, the pressure within the chamber **128** is raised to cause a dispensing of liquid through all brushes simultaneously. Alternatively, a medium pressure can be used to discharge and convey the liquid through all conduits and then the valves **112** act only to delay the dispensing of the liquid for a fraction of a second. This delay permits all conduits to become filled before actual dispensing onto the hair takes place.

FIG. **16** illustrates a cross-sectional view of a single brush member carried at the end of a support column **40**, as used in the apparatus of this invention. The brush member includes a brush face having a plurality of projecting bristles which contact the hair for spreading liquids to all parts of the hair. A brush-backing member **130** may be made from plastic, wood or rubber material and the bristles are sufficiently resilient to contact the head of a person while at the same time providing a safe spreading action of liquid being dispensed onto the hair. Although liquids may be dispensed into the headset through devices which are separate from the brush members, a preferred construction is shown where the dispensing of liquids takes place through the brush members. Various conduits, as already described, lead into the column **40** so as to discharge liquids into the column and down to a brush-dispensing nozzle **132**. The brush member also includes additional backing plates **134** which serve to attach the brush members to the perforated inner liner **114**. The inner liner may be secured to the backing plates of the brushes by sandwiching the same between the plates, as shown, or any other means of adhering the liner to the brushes may be used.

FIGS. **17** and **18** illustrate another embodiment of the invention in the form of a portable unit for use in the home. The portable unit includes a lower base portion **136** and an upper portion **138** which serves as a hood or headset for the unit. The two portions are latched together with fastening devices **140** to form a case for storage and carrying of the entire unit, and when they are separated, the upper portion or hood **138** is mounted on a hollow support column **142** which can be fitted into an opening **144** carried by the lower base portion **136**. The support column **142** serves as a duct for heated air to be blown upwardly and into the headset **138**. Also, various conduits for liquid lines can pass through the column and into the headset, in the same manner as they do in the commercial embodiment of FIGS. **1** and **2**. In its assembled form, the portable unit can be placed on a table with the hood or headset directed away from the base portion so that a person can be placed under the hood. The support column **142** is hinged at a central level so that it can be disassembled and stored within the headset as illustrated in FIG. **16**. The support column may be clipped or fastened in any known way to the interior of the case for storage. An upper mounting bracket **146** is carried by the support column for coupling with a receiving rod **148** carried on the outside of the upper portion of the unit. The support column is hollow so that heated air can be blown from a blower means carried in the base portion **136** into the opening **144** and up the column, where it is then dispersed to the interior of the headset. The headset includes all of the control and actuating devices described for the commercial embodiment of this invention, and likewise, means for discharging various liquids are provided in this form of the invention.

FIG. **18** illustrates certain elements carried within the base portion **136**, and these include a suction pump **150** for removing excess liquids that are drained downwardly through the column **142** for ultimate disposal. In addition a waterline adapter **152** is provided, and this attachment includes a resilient receiving neck **154** which can be fitted over the usual faucets of a home sink. The desired temperature of water can be controlled by the faucet handles and then the water is directed through the waterline **152** and into a receiving line in the headset. A bypass valve **156** is carried by the waterline, so that the flow of water through the line may be interrupted at any desired time by merely discharging water through the bypass valve. This valve may be of any conventional construction which permits a diversion of a water stream from a main line through a branch line and is used when the operator is initially adjusting faucets for a correct water temperature. The portable home unit also includes compressed-gas cartridges **158** which are used to expel liquids from packages that are punctured in the same manner as described above. The liquid-discharging device, including the cartridge-receiving chambers and the puncturing devices, is carried in an upper part of the portable unit at **138**.

In a typical operation of either of the embodiments of this invention, as discussed above, the customer is placed under the headset and the headband is inflated for a comfortable fit. Then a program selection is actuated by the operator by pushing automatic buttons associated with the programmer. The program will determine types of treatments to be administered, their duration and their sequence. If the operation is a shampooing operation, warm water is sprayed over the customer's head and then the shampoo solution is dispensed into the headset through the brush dispensers. After the hair is wetted with water and shampoo, the brushes are automatically activated so as to thoroughly apply the liquids throughout the entire hair and scalp area. Additional sequences can dispense rinse water, rinse solutions and any of

the sequences can be repeated as determined by the initial program which is fed into the machine. Upon completion of the treatment, the headset is tilted back 180° and is sterilized with a solution which is emitted through the brush nozzles or from a separate sterilizing device. The sequences are varied in accordance with beauty shop practices when it is desired to color or dye the hair and all functions of this type can be carried out with the single apparatus of this invention.

Although this invention has been described with reference to preferred embodiments, variations will become apparent to those skilled in the art, and such variations are intended to be included within the scope of the invention.

I claim:

1. Hair-treating apparatus comprising:

a headset having a crown, said headset being adapted to cover the hair and scalp area of the head of a person being treated;

a plurality of brush means mounted for movement within said headset for contacting and treating hair on the head of a person;

means for moving said brush means in a controlled pattern against the head of the person being treated;

means for extending and retracting said brush means into and out of contact with the person's head; and

dispensing means connected to the interior of said headset for selectively dispensing liquids to the hair being treated.

2. The apparatus of claim 1 wherein said plurality of brush means are mounted on an inner frame unit within said headset, said inner frame unit being connected for reciprocation about a vertical axis through the crown of said headset.

3. The apparatus of claim 2 wherein said inner frame unit includes holders radially extending from a central crown portion of the frame, said holders including means for mounting said plurality of brush means for reciprocatory movement along the arcuate axes of said holders.

4. The apparatus of claim 1 wherein said dispensing means include conduits leading from a liquid supply to the headset and wherein said conduits are connected to said plurality of brush means so as to dispense liquids through each of said brush means.

5. The apparatus of claim 4 wherein said conduits include valving means which are opened by fluid pressure within said conduits, whereby the dispensing of liquids into contact with the hair can be controlled by a control of pressure within the conduit.

6. The apparatus of claim 5 wherein said valving means are located in the proximity of the connection between each conduit means and each brush means, whereby liquid can be released into all brushes simultaneously, irrespective of differing lengths of individual conduits leading from the supply of the brush means.

7. The apparatus of claim 1, and including an adjustable headband means contained within said headset for confining liquids to only the hair and scalp regions of the person being treated, said adjustable headband means including a preformed adapter which is removably attached to the inner surface of said headset so as to define the hairline of the person being treated and an inflatable headband portion which can be inflated to confine liquids within said headset to the hair and scalp of a person without any leakage of said liquids past the hairline defined by the adapter.

8. The combination of claim 7 and including a hairnet retrieval tube carried by said headset for containing a hairnet in a stored condition and including access means to said tube means within said headset for removing the hairnet from its stored position.

9. In hair-treating apparatus having a headset means adapted to cover the hair and scalp area of the head of a person being treated and including a plurality of brush means and liquid-dispensing means within the headset for applying liquid treatments to the hair and scalp, the improvement comprising: programming means for controlling the sequence and duration of hair-treating operations applied through said headset, said programming means being operatively connected to control the flow of fluids to the headset in accordance with a desired sequence of treatment, and said programming means being operatively connected to said brushes to control the adjustment of brushes carried within said headset for operative contact with the hair and scalp of the head of a person being treated.

10. The apparatus of claim 1, and including discharge of liquid solutions to the dispensing means within said headset, said liquid-discharging means including a reservoir for receiving a quantity of liquid to be discharged to all dispensing means within said headset, and means for expelling said liquid from the reservoir and into separate conduit means leading to the separate dispensing means within the headset, said reservoir further comprising a chamber for receiving liquid cartridges, and including puncturing means carried within said chamber and associated with separate conduits leading to the headset for puncturing said liquid cartridges when they are placed within said chamber so as to release liquid into the separate conduits.

11. The improvement of claim 10 wherein said expelling means comprises a gas pressure means for expelling liquids from said cartridges and into said separate conduits.

12. The improvement of claim 11 wherein said gas pressure means includes a source of compressed gas and control means for controlling the amount of pressure applied to the liquid cartridges within said reservoir means, whereby a low pressure can be applied to initially discharge liquid from the cartridges without dispensing said liquid onto the hair and scalp of a person being treated and whereby a higher pressure can be applied to cause a dispensing of the liquid onto the hair and scalp at a desired time.